# Sample Questions from past final exam papers

Section A is mandatory. You must answer all of Question 1 in section A.
In Section B, please answer any 2 Questions.
Calculators are permitted.

**Section A:**
Q1 (worth 40 marks: made up of short questions covering the module (8 subparts (a,b,c,d,e,f,g,h), each worth 5 marks; you are to answer all 8 subparts); Example of the type of questions are presented below. Mandatory question.

**Section B:**
Q2, Q3, Q4 (each worth 30 marks); You are to only answer two out of the three questions presented. Examples of previous questions from this section are presented below.

40 + 30 + 30 = 100 marks

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Example of Section A questions (note: you will have **8** to answer on the day in Q1)

- How many microlitres are there in 2.8mL?
- How much NaCl is required to make 250mL of a 0.2M NaCl solution (MW NaCl: 58.44)?
- Define what a 'response element' in a gene is. Also, briefly describe the role of a response element and how it can lead to specific events occurring in a cell.
- DNA polymerase has a certain limitation. Describe this limitation and explain how the problem is overcome in DNA Replication.
- Name the three stages of a PCR (polymerase chain reaction) reaction and explain briefly what occurs during each one.
- Draw a detailed diagram of a mature messenger RNA (mature mRNA) and label the following: 5'cap, 3' poly A tail, the untranslated regions (UTRs), coding region, cleavage signal for poly a tail addition.

**Please note** these are sample questions for you to read through and review course materials. Final exam wording and question format will of course vary each year and this will be discussed further in lectures as we approach the exam.

Example of Section B type questions:

Agarose gel electrophoresis is a technique regularly used to analyse various molecular biology based applications such as polymerase chain reactions (PCRs) and restriction enzyme DNA digestions as well as to examine DNA or RNA integrity.

(a) How much Agarose do you need to weigh out to make 50mL of a 1.2% agarose gel? Also, how much 'SYBR Safe' will you add (SYBR safe provided as a 10,000X stock)? (4 marks)

(b) Agarose gel electrophoresis separates DNA molecules based on their size – explain how the technique performs this. Include a diagram of the equipment set-up involved. (13 marks)

(c) When preparing your sample, you often add loading dye. Explain the role of each of the components of this loading dye. (3 marks)

(d) Explain how you can interpret the size of a fragment/piece of DNA from performing this technique (include diagram(s) as part of your answer). (6 marks)

(e) Using a table, outline 3 key differences between Agarose gel electrophoresis and Sodium Dodecyl Sulphate – Polyacrylamide Gel Electrophoresis (SDS-PAGE). (4 marks)

Describe each of the following points **in detail** (please use diagrams as part of your answer):

(a) The events that occur during the initiation stage of Transcription (i.e. events at the promoter). (11 marks)

(b) The events that occur at a 'Transcription Bubble' as DNA is being transcribed to mRNA. (11 marks)

(c) The difference between the coding and template strands with regard to transcription. (8 marks)

In the cytoplasm, the process of **Translation** generates a protein from 'reading' a messenger RNA (mRNA). Describe the process of Translation and include diagrams as part of your answer. (30 marks)

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